

APPENDIX - CLAIMS

1. (Currently Amended) A method consisting of forming an admixture consisting of:
a solvent selected from the group consisting of ~~dimethylsulfoxide, dimethylacetamide, dimethylformamide~~, n-cyclohexylpyrrolidinone, dimethylenepropylene urea and N,N dimethyl propylene urea;
~~an acid-containing solution~~ plasticizer additive selected from the group consisting of:
poly-co-dimethyl aminopropyl siloxane, polyglycol diacid, 3,6,9 trioxaundecanoic acid, polyethylene glycol tetrahydro furfuryl ether, glycerol triacetate and epoxidized soy bean oil;
said solvent being different from said additive and
an electrically conductive conjugated polymer selected from the group consisting of substituted and unsubstituted polyparaphenylene vinylenes, polyparaphenylenes, polyanilines, polythiophenes, polyazines, polyfurans, polypyrroles, polyselenophenes, poly-p-phenylene sulfides, polyacetylenes,
a precursor to an electrically conductive conjugated polymer selected from the group consisting of substituted and unsubstituted polyparaphenylene vinylenes, polyparaphenylenes, polyanilines, polythiophenes, polyazines, polyfurans, polypyrroles, polyselenophenes, poly-p-phenylene sulfides, polyacetylenes;
said precursor to said electrically conductive conjugated polymer being made electrically conductive by means of a doping reaction; said doping reaction consisting of exposing said precursor to said conjugated polymer to ~~said an acid-containing solution~~ selected from the group consisting of ~~hydrochloric acid, camphorsulfonic acid~~, citric acid and acrylamidopropanesulfonic acid;
said conjugated polymer being dissolved in said solvent at a concentration that allows said conjugated polymer to be dissolved in said solvent;
said conjugated polymer not being substantially soluble in said plasticizer additive in the absence of said solvent;
~~said acid-containing solution~~ plasticizer additive provides local mobility to said conjugated polymer to allow regions of said conjugated polymer to associate with one another to achieve a crystalline state; and

removing or partly removing said solvent, substantially leaving said additive therein as remaining additive, said remaining additive provides local mobility to said conjugated polymer to achieve said crystalline state thereby comprising a polycrystalline material; said polycrystalline material is characterized by a degree of crystallinity regions and a degree of amorphous regions, said degree of crystallinity regions and said degree of amorphous regions are selected by selecting the composition of said additive, and the amount of said additive;

forming a film via a technique selected from the group consisting of spin-coating or solution casting from said admixture, said resulting film possessing isotropic conductivity.

2. (Canceled)

3. (Canceled) A method according to claim 1, ~~wherein said additive is selected from the group consisting of plasticizers and diluents~~ which also contains a diluent along with said plasticize additive.

4. (Canceled) A method according to claim 1, wherein said additive is a plasticizer, and is selected from the group consisting of: Adipic acid plasticizers, Azelaic acid plasticizers, Benzoic acid plasticizers, Citric acid plasticizers, Dimer acid plasticizers, Epoxy plasticizers, Fumaric acid plasticizers, Glycerol plasticizers, Isobutyrate plasticizers, Lauric acid plasticizers, Linoleic acid plasticizers, Maleic acid plasticizers, Sebacic acid plasticizers, Stearic acid plasticizers, Succinic acid plasticizers, Sulfonic acid plasticizers, Terpentines, Terpentine plasticizers, Siloxanes, Polysiloxanes, Ethylene glycols, Polyethylene glycols, Polyesters, Sucrose plasticizers, Mellitates, Myristic acid plasticizers, Oleic acid plasticizers, Palmitic acid plasticizers, Paraffin plasticizers, Phosphoric acid plasticizers, Phthalic acid plasticizers, Ricinoleic acid plasticizers, Tartaric acid plasticizers, Trimellitic acid plasticizers, Glycol plasticizers, Glycolates, Hydrocarbons, Phosphonic acid plasticizers, and Polysilanes.

5. (Canceled) A method according to claim 1, wherein said polymer is selected from the group consisting of substituted and unsubstituted polyparaphenylene vinylenes, polyparaphenylenes, polyanilines, polythiophenes, polyazines, polyfurans, polypyrroles, polyselenophenes, poly-p-phenylene sulfides, polyacetylenes formed from soluble precursors, combinations thereof and blends thereof with other polymers and copolymers of the monomers thereof.

6. (Previously Presented) A method according to claim 1, wherein said solvent, when removed or partly removed, forms a film which is further stretch oriented.

7. (Canceled) A method of fabricating a precursor to an electrically conductive conjugated polymer and an electrically conductive polymer consisting of: admixing a combination of a first material, a second acid containing solution additive doping material and a solvent:

said first material is selected from the group consisting of an electrically conductive conjugated polymer selected from the group consisting of substituted and unsubstituted polyparaphenylene vinylenes, polyparaphenylenes, polyanilines, polythiophenes, polyazines, polyfurans, polypyrroles, polyselenophenes, poly-p-phenylene sulfides, polyacetylenes,

a precursor to an electrically conductive conjugated polymer selected from the group consisting of substituted and unsubstituted polyparaphenylene vinylenes, polyparaphenylenes, polyanilines, polythiophenes, polyazines, polyfurans, polypyrroles, polyselenophenes, poly-p-phenylene sulfides, polyacetylenes;

said second acid containing solution additive doping material being selected from the group consisting of hydrochloric acid, camphorsulfonic acid, citric acid and acrylamidopropanesulfonic acid; and being soluble in said solvent,

which solvent is selected from the group consisting of dimethylsulfoxide, dimethylacetamide, dimethylformamide, n-cyclohexylpyrrolidinone, dimethylenepropylene urea and N1N' dimethyl propylene urea;

said second acid containing solution additive doping material not being substantially soluble in said first material in the absence of said solvent;
contacting said first material with said second acid containing solution additive doping material to render said first material electrically conductive by means of a doping reaction and providing local mobility to said first material to allow said conjugated ~~polymer~~ polymers to associate with one another to achieve a crystalline state;
removing or partly removing said solvent, substantially leaving said second acid containing solution additive doping material therein as a remaining additive doping material, said remaining additive doping material providing local mobility to said first material to achieve said crystalline state thereby comprising a polycrystalline material, said polycrystalline material is characterized by a degree of crystallinity regions and a degree of amorphous regions, said degree of crystallinity regions and said degree of amorphous regions are selected by selecting the composition of said additive, and the amount of said additive; forming a film via a technique selected from the group consisting of spin-coating or solution casting from said admixture, said film possessing isotropic conductivity.

8. (Canceled)

9. (Canceled) A method according to claim 7, wherein said polymer is selected from the group consisting of substituted and un substituted polyparaphenylene vinylenes, polythianaphthenes, polyparaphenylenes, polyanilines, polythiophenes, polyazines, polyfurans, polypyrroles, polyselenophenes, poly-p-phenylene sulfides, polyacetylenes formed from soluble precursors, combinations thereof and blends thereof with other polymers and copolymers of the monomers thereof.

10. (Canceled) A method according to claim 7, wherein said second material is selected from the group consisting of: Adipic acid plasticizers, Azelaic acid plasticizers, Benzoic acid plasticizers, Citric acid plasticizers, Dimer acid plasticizers, Epoxy plasticizers, Fumaric acid plasticizers, Glycerol plasticizers, Isobutyrate plasticizers, Lauric acid plasticizers, Linoleic acid plasticizers, Maleic acid plasticizers, Sebacic acid plasticizers,

Stearic acid plasticizers, Succinic acid plasticizers, Sulfonic acid plasticizers, Terpentines, Terpentine plasticizers, Siloxanes, Polysiloxanes, Ethylene glycols, Polyethylene glycols, Polyesters, Sucrose plasticizers, Mellitates, Myristic acid plasticizers, Oleic acid plasticizers, Palmitic acid plasticizers, Paraffin plasticizers, Phosphoric acid plasticizers, Phthalic acid plasticizers, Ricinoleic acid plasticizers, Tartaric acid plasticizers, Trimellitic acid plasticizers, Glycol plasticizers, Glycolates, Hydrocarbons, Phosphonic acid plasticizers, Polysilanes.

11. (Canceled) The method defined in Claim 1 wherein said method consists of a conjugated polymer which is polyaniline which is a substantially crystalline material which is dissolved in a solvent consisting of NMP to form a solution exhibiting bimodal or trimodal distribution in Gel Permeation Chromatography (GPC) as a result of aggregation induced by internal hydrogen bonding between chains in said polyaniline and exhibiting the GPC curve depicted in Figure 4, and said additive is 5% by weight poly-co-dimethyl propylamine siloxane and is a composition that provides local mobility to said polymer to allow regions of said conjugated diene polymer to associate with one another to achieve a crystalline state.

12. - 13 (Canceled)

14. (Canceled) A method according to claim 7 wherein said second acid containing solution additive doping material is selected from the group consisting of a plasticizer and a diluent, said solvent being different from said additive.

15. (Currently Amended) A method according to claim 1, wherein said plasticizer additive contains substituents which facilitate the miscibility of said polymer and said additive.

16. (Currently Amended) A method according to claim 1, wherein said plasticizer additive disrupts aggregation of said polymer.

17. - 19 (Canceled)

20. (Currently Amended) A method according to claim 1, wherein said additive plasticizer deaggregates said polymer.

21. (Canceled)

22. (Previously Presented) A method according to claim 1, wherein said solvent is extracted from said admixture by a technique selected from the group consisting of solvent extraction and evaporation.

23. (Currently Amended) A method according to claim 1, wherein said plasticizer additive is first added to a solvent and thereafter an electrically conducting polyaniline is added which becomes neutralized upon addition to said admixture.

24. (Canceled) A method according to claim 1, wherein said admixture contains a polyaniline, said additive, and an oxidant.

25. (Canceled) A method according to claim 1, wherein said additive includes a plasticization effect.

26 - 39 (Cancelled)

40. (Canceled) A method according to claim 1, wherein said additive is an oxidant.

41. (Canceled) A method according to claim 1, wherein said material is an oxidant.

42. (Canceled) A method according to claim 1, wherein said plasticizer is an oxidant.

43 – 46. (Canceled)

47. (Withdrawn) The method according to Claim 53 wherein said solvent is NMP and said additive is epoxidized soybean oil.
48. (Withdrawn) The method according to Claim 53 wherein said solvent is NMP and said additive is poly-co-dimethyl amino-siloxane.
49. (Withdrawn) The method according to claim 53, wherein said solvent is NMP and said additive is poly glycol diacid.
50. (Withdrawn) The method according to claim 53, wherein said solvent is NMP and said additive is 3, 6, 9-trioxaundecanoic acid.
51. (Withdrawn) The method according to claim 53, wherein said solvent is NMP and said additive is poly(ethylene glycol) tetrahydrofurfuryl ether.
52. (Withdrawn) The method according to claim 53, wherein said solvent is NMP and said additive is glycerol triacetate.
53. (Withdrawn) The method defined in Claim 7, comprising forming an admixture of:
a solvent selected from the group consisting of NMP, m-Cresol and a combination of NMP/m- cresol;
an additive selected from the group consisting of poly-co-dimethyl, amino siloxane, poly glycol diacid, 3, 6, 9-trioxaundecanoic acid, poly(ethylene glycol) tetrahydrofurfuryl ether, glycerol triacetate, and epoxidized soy bean oil;
polyaniline;
said polyaniline being soluble in said solvent, said polyaniline not being substantially soluble in said additive in the absence of said solvent; said additive provides local mobility to said polymer to allow said polymer to associate with one another to achieve a crystalline state; and removing or partly removing said solvent, substantially leaving said additive therein as remaining additive, said remaining additive provides local mobility to said polyaniline to achieve said crystalline state thereby comprising a polycrystalline

material, said polycrystalline material is characterized by a degree of crystallinity regions and a degree of amorphous regions, said degree of crystallinity regions and said degree of amorphous regions are selected by selecting the composition of said additive, and the amount of said additive;

said admixture being electrically conductive and having an isotropic electrical conductivity.

54. (Withdrawn) A method comprising forming an admixture of:

a solvent selected from the group consisting of DMSO, DMF, NMP, dimethylene propylene urea, tetramethyl urea, pyridine, toluene, m-Cresol, phenol, dimethylacetamide, n-cyclohexylpyrrolidinone, 80% aqueous acetic acid, 60 - 88% aqueous formic acid, pyrrolidinone, N, N' dimethyl propyl urea, benzyl alcohol, and a combination of NMP/m-cresol;

an additive selected from the group consisting of Adipic acid, Azelaic acid, Benzoic acid, Citric acid, Dimer acid, Epoxy, Fumaric acid, Glycerol, Isobutyrate, Lauric acid, Linoleic acid, Maleic acid, Sebacic acid, Stearic acid, Succinic acid, Sulfonic acid, Terpentines, Siloxanes, Polysiloxanes, Ethylene glycols, Polyethylene glycols, Polyesters, Sucrose, Mellitates, Myristic acid, Oleic acid, Palmitic acid, Paraffin, Phosphoric acid, Phthalic acid, Ricinoleic acid, Tartaric acid, Trimellitic acid, Glycol, Glycolates, Hydrocarbons, Phosphonic acid, and Polysilanes,

said solvent being different from said additive and

a polymer selected from the group consisting of a precursor to an electrically conductive polymer and an electrically conductive polymer, said precursor to said electrically conductive polymer being made electrically conductive by means of a doping reaction with an acid, said polymer being selected from the group consisting of substituted and unsubstituted polyparaphenylene vinylenes, polyparaphenylenes, polyanilines, polythiophenes, polyazines, polyfurans, polypyrroles, polyselenophenes, poly-p-phenylene sulfides, polyacetylenes formed from soluble precursors, combinations thereof and blends thereof with other copolymers of the monomers thereof.; said polymer being soluble in said solvent, said polymer not being substantially soluble in said additive in the absence of said solvent; said additive provides local mobility to said polymer to allow

regions of said polymer to associate with one another to achieve a crystalline state; and removing or partly removing said solvent, substantially leaving said additive therein as remaining additive, said remaining additive provides local mobility to said polymer to achieve said crystalline state thereby comprising a polycrystalline material, said polycrystalline material is characterized by a degree of crystallinity regions and a degree of amorphous regions, said degree of crystallinity regions and said degree of amorphous regions are selected by selecting the composition of said additive, and the amount of said additive; forming a film from said admixture, said film possessing isotropic conductivity.

55. (Withdrawn) The method defined in Claim 54 wherein said solvent is cresol, said polymer is polyaniline and said additive is poly-co-dimethyl propylamine siloxane, a composition that provides local mobility to said polymer to allow regions of said conjugated diene polymer to associate with one another to achieve a crystalline state.

56. (Withdrawn) The method defined in Claim 54 wherein said solvent is NMP/cresol, said polymer is polyaniline and said additive is poly-co-dimethyl propylamine siloxane and is a composition that provides local mobility to said polymer to allow regions of said conjugated diene polymer to associate with one another to achieve a crystalline state.